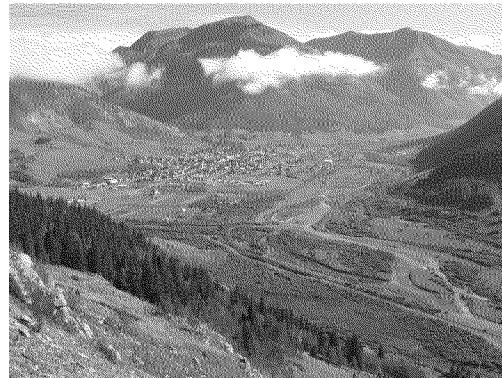
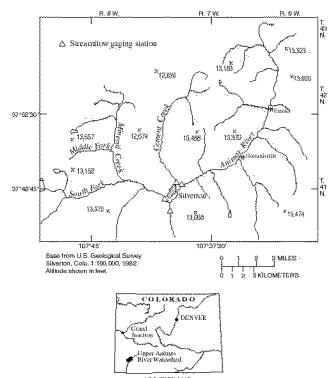




# Animas Watershed Abandoned Mine Cleanup



**Background** - The Animas Watershed is located in the San Juan Mountains of southwestern Colorado, rimmed by 14,000' peaks and drained by three streams originating in a volcanic caldera: Mineral Creek, Cement Creek, and the Upper Animas. These tributaries join at the town of Silverton to form the Animas River, which eventually flows into the San Juan River in New Mexico.

The Upper Animas Watershed has a long history of extensive metal mining as an economic mainstay dating back to the 1880s. Headwaters contamination in the Silverton vicinity is from both mining activities and natural sources. Metal contaminants such as aluminum, arsenic, cadmium, copper, iron and zinc, arising from historical mining have severely impacted aquatic life and habitat. Fear of Superfund, a desire to improve these environmental conditions, coupled with the necessity to meet minimum stream standards imposed by the Clean Water Act have driven a process to significantly reduce metal contamination wherever feasible.

Using a watershed approach, the Animas River Stakeholders Group (ARSG) has synthesized scientific findings with economic, social, and political consideration to influence future regulatory and land management decisions. The mission of ARSG is to improve water quality and habitats in the Animas River through a collaborative process designed to encourage participation from all interested parties. Participants include mining companies, elected officials, local citizens and interest groups, environmental organizations, and landowners, including federal and state agencies.

The Animas River Stakeholders Group (ARSG) is comprised of:

- Local organizations - San Juan Citizens Alliance, Western Colorado Congress, Friends of the Animas River, Taxpayers for Animas River, Four Corners Action Coalition, River Watch Network Cities
- Durango, Silverton
- San Juan County
- Durango-Silverton Narrow Gauge Railroad
- Southwestern Colorado Water Conservancy District
- San Juan Resource Conservation and Development Council
- Industry - Gold King Mining, Root and Norton, Howardsville Mill, Echo Bay Mining, Sunnyside Gold, Mining and Remedial Recovery Co.
- State agencies - Division of Wildlife, Division of Minerals and Geology, the Water Quality Control Division



- Federal agencies - Bureau of Reclamation, Bureau of Mines, Bureau of Land Management, US Forest Service, US Geological Survey, Environmental Protection Agency, Oak Ridge National Laboratory

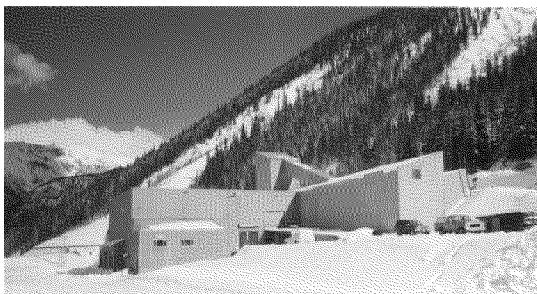


Figure 37. Pride of the West Mill near Silverton, San Juan County (Photo courtesy of Steve Fearn).



**Characterization** - The Animas River Stakeholders Group (ARSG) has used a comprehensive, scientifically-based approach for characterization in which the watershed is looked at as a whole. The approach has included monitoring of existing conditions, characterization of metal loading sources, determination of biological potentials and feasibility for remediation, and implementation of cleanups. Starting with over 1500 mine sites, the field was narrowed down to detailed characterization of approximately two hundred of the most significantly contributing sites. Metal contributions and physical parameters were evaluated at both low and high flow regimes. Data from all sub-basins was compiled, analyzed, and incorporated into a Use Attainability Analysis (UAA) for the Animas watershed in 2001. The analysis indicates that 34 draining mines and 33 waste piles contribute 90% of all metal contributions from historic mining.

**Feasibility** – As part of the UAA over 350 of the top priority mine sites were evaluated to determine the feasibility for remediation using existing technology. Moving waste piles from contact with water comprised most of the first tier of projects. Next preference was given to passive systems that require no or little perpetual maintenance and operating cost. Based on anticipated metal reductions following remediation implementation, goal based stream standards were recommended. These standards were adopted in 2001. Twenty nine Total Maximum Daily Loads (TMDL's) for four stream segments were established in 2002.

As over 85% of the upper Animas Watershed is federally managed, the Federal government has played an active role. First, the watershed was identified as one of the two national pilot watersheds to investigate abandoned mine cleanup on federal land. About  $\frac{3}{4}$  of the federal land is managed by the Bureau of Land Management and  $\frac{1}{4}$  by the U.S. forest Service. One of the reasons this watershed was chosen was that a test co-managed office had been established in Durango for this area. The USGS assisted with massive coordinated mining scientific undertaking to be published this year. Also, federally managed abandoned mine cleanup projects have been significant. In addition, federal land managers in cooperation with EPA, have taken 106 actions under CERCLA, resulting in more cleanups. This area was also chosen as one of the six pilot for the Brownfields Mine-Scarred Lands initiative. Many activities have taken place under this program.

**Implementation** - Remediation is well underway - over 13 million dollars of cleanup has taken place. In 2003 the Pride of the West Mill (Howardsville Mill) was authorized to reprocess mine waste and tailings materials from the Animas Watershed as part of the remediation efforts. The mill was permitted by the State of Colorado and was required to line the tailings facility and to conduct surface and groundwater monitoring to ensure compliance with State requirements. ARSG has removed several highly mineralized mine dumps and delivered them to the Howardsville mill for metals removal, partial cost recovery, job creation, and "permitted" disposal. However, the operation encountered difficulties due to abnormal weather conditions and other financial difficulties. The reprocessing effort, although admirable, was not successful.

In addition the Sunnyside Gold Corp. (Echo Bay Mines), as part of a negotiated settlement with the State of Colorado to be relieved of NPDES obligations, has cleaned up several abandoned



and several permitted sites. The BLM and Forest Service have completed remediation projects on public lands. Silver Wing Co., Gold King Mines, Mining Remedial Recovery Co. and Salem Minerals have also accomplished important cleanup projects. ARSG has played a key role in most of these projects.

**Results** - It can be demonstrated that in-stream water quality has improved significantly downstream. Also anecdotal evidence shows that miles of stream now support fish where fish were not seen before. Biological surveys will take place shortly to confirm these observations. However, in the upper watershed the natural variability has obscured the improvements and improvement cannot be demonstrated statistically.

The Animas River Stakeholders Group is an inspiration to many others on how community-based environmental stewardship can work.